Statcom enables flexible grid connection for mine

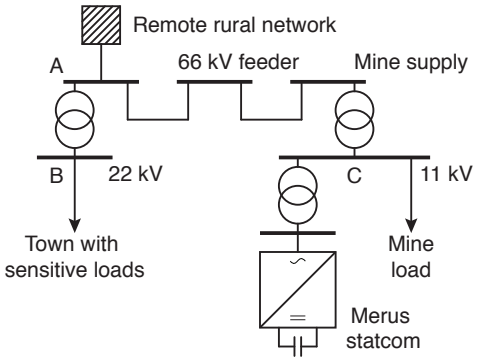
Static compensators (statcoms) can be used in applications ranging from voltage balancing, flicker mitigation, voltage support, and with the right configuration, even harmonic filtering.

Most statcoms are based on insulated gate bipolar transistor (IGBT) or similar inverter technology. This technology is mature, modular and widely applied. Yet not all statcoms are created equal. This note describes in the context of a recent application why the Merus Power statcom is such an attractive solution.

Network

A mine and mineral process plant in a remote location wished to increase production. The mine is connected to the very remote end of a weak 66 kV distribution feeder. The mining load is supplied from an 11 kV busbar and consists of variable speed driven mill motors, crushing, underground vent fan loads, and a mineral process plant.

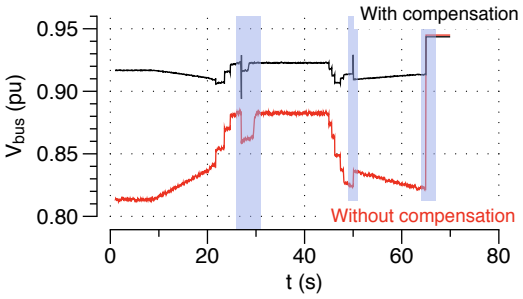
The supply network has the thermal capacity to deliver the additional power to the mine. The network owner had concerns about flicker and voltage stability in the whole local network, including a town several kilometres from the mine. The town is supplied from a 22 kV transformer supplied from the same feeder as the mining load. The concerns related to the starting or stopping of the mill motors, direct-on-line starting of the vent fan motors, and loss of the total plant itself.



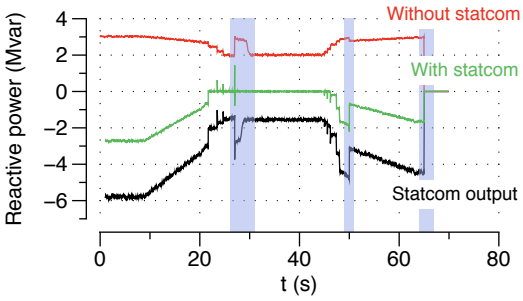
A statcom solution is supplied and connected to the mine's 11 kV busbar. The statcom consists of ±4 Mvar of dynamic compensation and a 3.9 Mvar fixed capacitor bank. The performance of the solution is evaluated on the basis of a series of worst-case events: starting and stopping the large variable speed mill drives, starting the largest direct-on-line motor in the mine, and complete load rejection of the mine as a result of 66 kV breaker operation.

Performance

The graph below shows the voltage at busbar B in the diagram. The traces ignore any voltage regulation that may be used to normalise the steady state busbar voltage. Without any compensation normal mine operation, DOL motor starting (first blue sector), ball mill tripping (second blue sector) and complete mining load loss (third blue sector) results in large voltage variations at the remote busbar B, as much as 10% in the case of complete loss of load.



The statcom ensures that voltage variations are limited to well within the ±5% range limit set by the network owner, under all load contingencies. The graph below illustrates how the statcom reactive power output changes instantaneously to ensure voltage levels are maintained.



The complete statcom system is designed, manufactured, tested, installed and commissioned within five months of receipt of an order.

Conclusion

The Merus Power statcom solution is flexible enough to provide ultra-fast voltage support, balance network voltages, and act as a harmonic filter – all at the same time. In this way overall power quality is improved at the node where it is connected and elsewhere in the system, to the benefit of the client and broader network.

Combining the powerful statcom solutions and the intimate understanding of networks and project delivery skills provided by Optimised Network Equipment provides our clients with unmatched performance and project delivery time frames.

Optimised Network Equipment Pty Ltd
ABN 56 151 739 374
www.onegrid.com.au

41/ 2 Benson Street Toowong QLD 4066
PO Box 1951 Toowong QLD 4066
info@onegrid.com.au